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Developing a student-doctoral education fit analytical model to assess performance

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ABSTRACT

Understanding factors that cause students problems throughout their doctoral education is of benefit to doctoral educators striving to improve doctoral completion rates. In this paper, Baker and Pifer's (2015, "Antecedents and Outcomes: Theories of Fit and the Study of Doctoral Education." *Studies in Higher Education* 40 (2): 296–310.) multidimensional framework of student-doctoral fit is extended to create a more nuanced framework comprising student-doctoral environment fit (including the sub-dimensions: student-organisation fit, student-private environment fit and student-people fit), student-vocation fit (including the sub-dimensions: student-motivation fit and student-learning environment fit) and student-doctoral culture fit (including the sub-dimensions: student-learning identity fit, student-(academic)writing fit and student-personal characteristics fit). We then operationalise the framework to create a doctoral student education fit analytical framework for providing insights on the association between fit and doctoral student performance. Our analytical model provides a springboard for fieldwork to examine student-doctoral education fit and doctoral student performance.

KEYWORDS

Analytical framework; doctoral student performance; doctoral education; fit theory

Introduction

The literature has directed considerable attention to examining doctoral education. For example, studies investigate problems encountered throughout the doctoral process (Plumlee and Reckers 2014), the role of the supervisor (Beattie and Smith 2012; Bell-Ellison and Dedrick 2008; Rose 2005), issues with new academic staff joining faculty following doctoral studies (Newell, Langsam, and Kreuze 1996), new models of doctoral education (Trapnell et al. 2009) and the problem of untimely doctoral completion and attrition (Booth and Satchell 1995; Neumann and Rodwell 2009; Stock, Finegan, and Siegfried 2006, 2009; Wright and Cochrane 2000). Missing from the literature is an agreed theoretical framework for the evaluation of a comprehensive range of factors deemed to affect doctoral student performance. Baker and Pifer (2015) make a valuable contribution to this gap by suggesting a framework for gaining insights on doctoral education based on the theory of fit. Westerman, Nowicki, and Plante (2002) and Westerman and Vanka (2005) use a fit perspective to examine student performance in classroom-taught business and management education. However, a fit perspective has not been applied in the context of postgraduate or doctoral student performance.

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The theory of fit is a theoretical construct from the organisation studies' literature that infers that individuals' performance improves when there is alignment between individuals' values and those of their organisation, task or social structure (Edwards and Billsberry 2010; Tong, Wang, and Peng 2015). The theory of fit is complex as fit is multidimensional (Edwards and Billsberry 2010) and fluid (Baker and Pifer 2015). Studies examine fit from several dimensions. For example, when considering job-person fit, Kristof-Brown, Zimmerman, and Johnson (2005) focus on environmental fit and report an association between environment fit and job satisfaction, performance, absenteeism and staff turnover. Chatman (1991) focuses on values fit and finds that fit between individuals' and organisational values is associated with job satisfaction, tenure and commitment to the organisation. In terms of its fluidity, Baker and Pifer (2015, 308) describe fit as 'influenced by contexts, individual characteristics and relationships'. This versatility makes the theory particularly relevant as a lens through which to model the multiple factors in the literature influencing doctoral student performance (Baker and Pifer 2015). Baker and Pifer (2015) restrict their framework to students' learning identity, or 'doctoral fit' with their learning curriculum. Missing from their theoretical framework is the influence of students' private environment on their ability to engage fully with their doctoral programme and consideration of the more nuanced aspects of doctoral education, identified as important in the empirical literature on doctoral student performance (Wright and Cochrane 2000).

We make two theoretical contributions to the literature. First, we further develop Baker and Pifer's (2015) theoretical framework, to include sub-dimension fit classifications that enable a more targeted evaluation of student-doctoral education fit. We interrogate prior empirical studies on doctoral education to identify factors found to influence doctoral student performance. Informed by this literature, we expand Baker and Pifer's framework to include 'student-private environment fit', 'student-(academic)writing fit' and 'student-personal characteristics fit'. Our final student-doctoral education fit framework may be tailored for any subject area and for country differences in approaches to doctoral education.[1] Second, Baker and Pifer (2015) apply their framework in the context of part-time doctoral education and international doctoral students. We further expand use of the theory of fit, to examine doctoral student performance (i.e. timely/untimely/non-completion). This involves the creation of a student-doctoral education fit analytical model that includes a broad range of factors (proxies for divergence from fit) identified from the doctoral education literature to have a negative influence on doctoral student performance.

We structure the paper as follows. The next section reviews the literature and uses this to further develop Baker and Pifer's (2015) doctoral education fit framework and to develop propositions therefrom. The following section demonstrates how the doctoral education fit framework can be operationalised to examine whether 'fit' is associated with doctoral student performance. This involves the creation of a doctoral education fit analytical framework. The conclusions, policy implications and main limitations of the study are considered in the final section.

Literature, analytical framework and propositions

In this section, we outline our refinements to Baker and Pifer's (2015) doctoral education fit framework.

Theoretical framework: student-doctoral education fit framework

Problems arise when investigating fit, as situational and individual factors that change throughout the period of doctoral study can influence 'fit'. Therefore, when examining fit, controlling for phase of doctoral education is important. Identifying, defining and measuring factors that reflect fit is difficult due to the multidimensional nature of people and their environments (Billsberry et al. 2005; Edwards and Billsberry 2010). Researchers typically use two approaches. The first, a multidimensional approach, models all relevant fit dimensions collectively to predict overall fit with a collection of behaviour outcomes (Chuang, Shen, and Judge 2016; Jansen and Kristof-Brown 2006). For

example, Jansen and Kristof-Brown (2006) create a multidimensional construct that includes five fit inputs (person-organisation fit, person-people fit, person-job fit, person-group fit, person-vocation fit) as predictors of three behaviour outputs including job satisfaction, commitment and intention to leave. Edwards and Billsberry (2010) also test Jansen and Kristof-Brown's model. Chuang, Shen, and Judge (2016) create a Perceived Person-Environment Fit Scale that includes four input measures, person-job fit scale, person-organisation fit scale, person-group fit scale and person-supervisor fit scale. They find their scale predicts job satisfaction, intent to leave and organisation citizenship behaviour. Chuang, Shen, and Judge (2016) argue that a multidimensional approach is more consistent with how individuals experience fit, because of the myriad of fit dimensions individuals experience simultaneously within their environment.

The second approach focuses on single dimensions of fit measured separately (Turban and Keon 1993). Edwards and Billsberry (2010) suggest that a multidimensional approach is most appropriate when people start a new role, as they try to obtain a sense of their fit with the new role and all the different fit dimensions that the role encapsulates. If they consider themselves misfits, they will leave (Schneider 1987). Remaining implies they do not consider themselves misfits. However, their performance may be affected by their perceptions of more nuanced aspects of fit. Therefore, in such circumstances, Edwards and Billsberry (2010) consider a single-dimension approach more salient than a multidimensional approach.

In terms of doctoral education, Baker and Pifer (2015) suggest a multidimensional theoretical framework consisting of three dimensions of fit: student-doctoral environment fit, student-vocation fit and student-culture fit. These broad areas of fit are also used by Westerman and Vanka (2005) and Westerman, Nowicki, and Plante (2002) to examine management training education in higher education institutions, though they refer to them as work environment congruence, values congruence and personality congruence.

Following a review of the literature on doctoral completion, we refine Baker and Pifer's framework, by including sub-dimensions of fit for each of their three main dimensions. In addition, we expand their framework to include a student-private environment fit sub-dimension and two other fit dimensions noted as being important to timely doctoral completion – student-(academic) writing fit and student-personal characteristics fit. The use of themed sub-dimensions enables a more targeted evaluation of factors that cause divergence from fit and, in extreme cases, misfit with doctoral education. Our refined framework benefits policymakers striving to improve doctoral completion rates. We portray our refined multidimensional framework in Figure 1.

As portrayed in our analytical framework in Figure 1, student-doctoral education fit encompasses the student-doctoral environment fit, student-vocation fit and student-doctoral culture fit. These are now discussed in turn.

Student-doctoral environment fit

Person-environment fit is the congruence between the characteristics of individuals and their work environment (Chuang, Shen, and Judge 2016; Kristof-Brown, Zimmerman, and Johnson 2005). In the context of student-doctoral education fit, this includes fit between doctoral students and their university environment, including institution, department, faculty members and peers (Baker and Pifer 2015). We argue that the student-doctoral environment fit dimensions should include students' external private environment as the distinction between work and home is blurred when it comes to doctoral education due to its unstructured nature. The literature identifies that private circumstances, commitments and interests external to the study environment can have a challenging impact on student doctoral education (Thouaille 2017; Tobbell, O'Donnell, and Zammit 2010; Wright and Cochrane 2000). In addition, empirical literature investigating untimely doctoral completion has identified factors from a student's private environment as having a negative influence on doctoral completion (Thouaille 2017). Examples include opportunities to earn funds elsewhere (Tong, Wang, and Peng 2015), personal circumstances (Tobbell, O'Donnell, and Zammit 2010) and ill-health (Levecque et al. 2017). Therefore, to determine the most influential aspects of student-doctoral

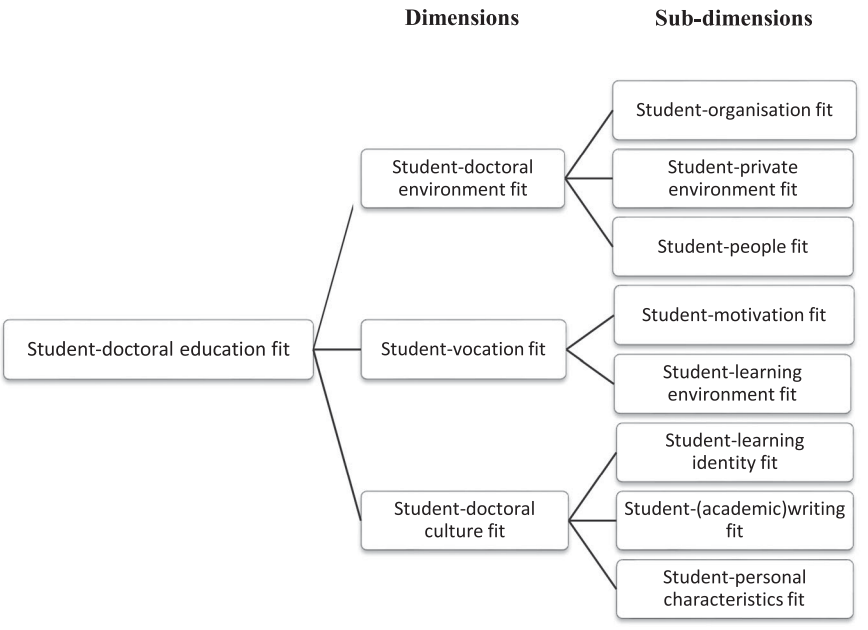

Figure 1. Student-doctoral education fit analytical framework.

environment fit on timely doctoral completion, we identify three distinct environment fit sub-dimensions: student-organisation fit, student-private environment fit and student-people fit, where people includes supervisors, faculty members and peers.

Student-vocation fit

Person-vocation fit refers to the congruence between individuals and their chosen career. When congruence is high, performance in terms of satisfaction, persistence and productivity in a specific vocation is higher (Osipow and Fitzgerald 1996 cited in Baker and Pifer 2015). Many doctoral students enrol for doctoral education as a stepping stone towards a career in academia, although there is evidence of leakage to positions outside academia (Hunter and Devine 2016). Perceived fit with an academic career may diminish as students progress through their doctoral programme and gain a greater understanding of an academic's role, especially the stringent quality and critical-feedback mechanisms at this level of study. In the context of doctoral education, Baker and Pifer (2015) define student-vocation fit as the positive feelings students have towards their doctoral programme and associated learning environment and curriculum. If doctoral education does not sufficiently prepare doctoral students for a career in academia, then divergence from fit with their programme may result as students progress through their programme. To determine the most influential aspects of student-vocation fit on untimely doctoral completion, we create two sub-dimensions: student-motivation fit and student-learning environment fit, to further analyse this dimension according to satisfaction and fit with the programme.

Student-doctoral culture fit

Culture influences attitudes and behaviour (O'Reilly and Chatman 1986) and fit is more likely when individuals' values are aligned with that of their organisation. Student-doctoral culture fit occurs when students share values with their doctoral learning identity and curriculum (Baker and Pifer 2015). Values encapsulate expected research culture, professional behaviour and productivity. With aligned values, individuals adapt more effectively to their new role (Bretz and Judge 1994; Vendenberghe 1999; Yamazaki and Kayes 2004). Therefore, we use evidence of difficulties in the transition to

doctoral education as an indicator of divergence in student-doctoral culture fit. Doctoral education has a different culture to undergraduate and postgraduate educational programmes. Learning is independent, self-directed and responsibility for learning is firmly with doctoral students. Feedback is detailed and is typically critical. In addition, the size of the project, the depth of knowledge required and writing at this level may not be as anticipated by students. We focus on three key transitional problems identified by the literature to capture divergence in student-doctoral culture fit, including perceived shift in students' learning identity from structured learning to independent learning (Fry, Pearce, and Bright 2007), difficulties with academic writing (Wisker et al. 2003) and perceived weakness in personal characteristics (Rogers 2006), wherein students consider that they do not have the personality to take criticism or the rigour required for research at this level.

In summary, we define student-doctoral education fit/misfit as the congruence/incongruence between students and their doctoral education.

Creation of the student-doctoral education fit analytical model

In this section, we examine how the student-doctoral education fit framework can be operationalised to provide insights on doctoral student performance (i.e. timely/untimely/non-completion). We use propositions to summarise our predictions regarding the influence of fit factors on doctoral student performance. Overall, the student-doctoral education fit framework predicts that doctoral student performance is related to fit between doctoral students and doctoral education. Therefore, an overarching proposition emanating from the student-doctoral education fit framework is:

P1: Doctoral student performance is associated with doctoral students' perceptions of fit with doctoral education.

To provide a frame for investigating this prediction, we operationalise the student-doctoral education fit framework by creating a student-doctoral education fit analytical model. Our analytical model identifies factors that enable the measurement of convergence/divergence from fit/misfit with doctoral education at dimension, sub-dimension and at factor level. Our analytical framework therefore enables investigation using both a multidimensional and a unidimensional approach.

To enable an evaluation of the influence of different fit dimensions, and to obtain a measure of overall fit, we identify 27 fit factors from the literature found to negatively impact timely doctoral completion. We then create a student-doctoral education fit analytical model of fit/misfit factors using the dimension and sub-dimension categories in our analytical framework in Figure 1. We summarise our analytical model in Table 1. Delineating issues found to affect untimely doctoral completion into sub-dimensions is not an exact science. Some factors can be easily categorised. For example, dislike of receiving criticism about work (Factor 25) reflects divergence from student-personal characteristics fit. However, other factors, such as difficulties with time management (Factor 26), may be interpreted as reflecting divergence from 'student-personal characteristics fit' or from 'student-private environment fit', depending on whether students consider this a personal weakness or a function of their environment.

At dimension level, the student-doctoral education fit framework predicts that doctoral student performance is related to fit between doctoral students and three dimensions of fit – student-doctoral environment fit, student-vocation fit and student-doctoral culture fit. We now explain the different dimensions, the different sub-dimensions and individual fit factors in our analytical model.

Student-doctoral environment fit

In general, we propose that:

P1.1: Doctoral student performance is associated with doctoral students' perceptions of fit with the doctoral environment.

The student-doctoral environment fit dimension has three sub-dimensions: student-organisation fit, student-private environment fit and student-people fit.

Table 1. SDEF[a] analytical model mapping the SDEF[a] framework (Figure 1) to fit/misfit factors.

Fit-theory dimensions	Fit-theory sub-dimensions	No.	Misfit factors
Student-doctoral environment fit (P1.1)	Student-organisation fit (P1.1a)	1.	Lack of quiet accommodation in the university
		2.	Lack of equipment (PC, laptop, printer, etc.)
	Student-private environment fit (P1.1b)	3.	Lack of funding/funding ended
		4.	Opportunities to earn funds elsewhere
		5.	Teaching hours/External workload excessive
		6.	Family commitments (dependents)
		7.	Other commitments (sport, hobbies, etc.)
		8.	Ill-health/Mental health
	Student-people fit (P1.1c)	9.	Insufficient support from supervisor
		10.	Insufficient support from employer
		11.	Insufficient support from partner/family
Student-vocation fit (P1.2)	Student-motivation fit (P1.2a)	12.	Lack of interest in research in general
		13.	Lack of interest in the topic
		14.	Perceived value of doctoral qualification diminished
	Student-learning environment fit (P1.2b)	15.	Difficulties obtaining the data required
		16.	Doctoral course scheduling (content/ timing/location)
		17.	Insufficient research training
		18.	Pressure to publish the research
Student-doctoral culture fit (P1.3)	Student-learning identity fit (P1.3a)	19.	Difficulties with working independently
		20.	Difficulties with the isolation of working alone
		21.	Project size: The task is immense
		22.	Project management greater than expected
	Student-(academic)writing fit (P1.3b)	23.	Difficulties with (academic)writing
	Student-personal characteristics Fit (P1.3c)	24.	Loss of status since enrolling
		25.	Dislike of receiving criticism about work
		26.	Difficulties with time management
		27.	Deteriorating confidence since enrolling

[a]SDEF: Student doctoral education fit.

Student-organisation fit. Baker and Pifer (2015) define student-organisation fit as students' compatibility with their academic institution.[2] From the literature on timely doctoral completion, several organisational issues are noted as negatively influencing doctoral completion that can capture perceived lack of fit, including: limits placed on doctoral students' access to university services (Tobbell, O'Donnell, and Zammit 2010) and restricted access to office space early in the programme (Stock, Finegan, and Siegfried 2009). Therefore, in our model, claims of inappropriate institutional facilities act as a proxy for divergence between students' view of what their institution should be providing and support received. The relationship between student-organisation fit and doctoral completion can be examined under Proposition 1.1a.

P1.1a: Doctoral student performance is associated with doctoral students' perceptions of university facilities for doctoral education.

Measurable indicators for divergence from student-organisation fit include an assessment of the appropriateness of study space and equipment (Factor 1 and Factor 2: Table 1).

Student-private environment fit. Student-private environment fit refers to compatibility between students' private lives and doctoral education. Tangential support for the relevance of students' private environment on their doctoral student performance is evident from the doctoral-completion literature, which identifies an association between factors in students' private domain and their performance, typically measured as timely completion. Studies report a link between funding (Kyvik

and Olsen 2014; Powell and Green 2007; van der Haert et al. 2014; Visser, Luwel, and Moed 2007), financial incentives (Thune et al. 2012) and alternative opportunities (Golde 2005) on doctoral completion. Moreover, competing alternatives can cause role conflict and even burnout (Tong, Wang, and Peng 2015). The competing alternatives are not necessarily financial. They can also be family related. These financial and moral pressures may weaken perceived fit with doctoral education, resulting in underperformance. Hockey (1996) and Levecque et al. (2017) report unpredictable adverse events in a doctoral students' private domain, such as poor health, as negatively influencing timely doctoral completion. Ill-health may cause changes, physical or mental, that affect students' ability to engage with doctoral education, affecting timely doctoral completion. Therefore, we propose that:

P1.1b: Doctoral student performance is associated with doctoral students' perceptions of fit with students' private environment

Measurable indicators of divergence from student-private environment fit in Table 1 include impact of funding (Factor 3), alternative opportunities to earn funds (Factor 4), external workload pressure (Factor 5), family commitments (Factor 6), other commitments or interests (Factor 7) and ill-health/mental-health (Factor 8).

Student-people fit. Student-people fit captures the interpersonal compatibility between doctoral students and people, including their supervisor/s (Baker and Pifer 2015). Westerman and Vanka (2005) report that student-professor congruence is a significant predictor of student satisfaction in management education at higher-education institutions. Though not empirically tested, the literature on timely doctoral completion suggests that supervisory support is important to doctoral progression (Becher, Henkel, and Kogan 1994; Egan et al. 2009; Hoskins and Goldberg 2005; Kyvik 2012; Sinclair, Barnacle, and Cuthbert 2014; Thune et al. 2012). We extend this viewpoint to consider the influence of support from other relevant connected persons, including family, friends and/or employers. The influence of the student-people fit sub-dimension and untimely doctoral completion is captured in Proposition 1.1c.

P1.1c: Doctoral student performance is associated with support from supervisors, family, friends or employers respectively.

Relevant measurable indicators of divergence from the student-people fit sub-dimension in Table 1 include support from supervisors (Factor 9), employers if employed (Factor 10) and partners and/or family (Factor 11).

Student-vocation fit

In general, we propose that:

P1.2: Doctoral student performance is associated with doctoral students' perceptions of fit with a research-based vocation.

Student-vocation fit has two sub-dimensions: student-motivation fit and student-learning environment fit.

Student-motivation fit. Studies on doctoral completion identify motivation as important to timely completion (Hockey 1996; Vuolanto, Pasanen, and Aittola 2006). Insufficient initial motivation impairs doctoral students' ability to deal with unexpected challenges (Golde 2005; Lovitts 2001). Tobbell, O'Donnell, and Zammit (2010) find that students who study topics suggested by supervisors and not by the students themselves have a more negative learning experience. Though not specifically referring to fit, empirical studies report a positive link between emotional engagement with doctoral topic, timely doctoral completion, research publication and a successful academic career (Gardner 2009; Jensen 2013; McAlpine 2012; Turner and McAlpine 2011). In our model, the

influence of student-motivation fit sub-dimension and doctoral student performance is captured by Proposition 1.2a.

P1.2a: Doctoral student performance is associated with students' doctoral studies' motivation.

We capture divergence from student-motivation fit in our student-doctoral education fit analytical model (Table 1) using three factors. The first measures whether students' interest in research has deteriorated in general (Factor 12). The second measures students' interest in their research topic (Factor 13). Finally, the third measures whether students' perception of the value of a doctoral qualification has diminished (Factor 14).

Student-learning environment fit. The second sub-dimension of student-vocation fit is student-learning environment fit. Baker and Pifer (2015) identify the important role that a positive learning curriculum, including relevant courses and associated learning environment experiences, have on maintaining student-vocation fit. Proxies for misalignment between students' expectations and their learning environment resulting in untimely doctoral completion include inflexible approaches to courses and structures including location (Tobbell, O'Donnell, and Zammit 2010), difficulties accessing data (Beattie and Smith 2012), organisation of research training (Kyvik and Olsen 2014; Sadlak 2004) and quality and timing of research training (Humphrey, Marshall, and Leonardo 2012). We predict the relationship between the learning environment and untimely doctoral completion under Proposition 1.2b.

P1.2b: Doctoral student performance is associated with doctoral students' perceptions of their doctoral learning environment.

We measure divergence in student-learning environment fit in Table 1 using students' perceptions of whether they have trouble in obtaining data (Factor 15), whether the doctoral learning provision is appropriate to their needs as measured by sufficiency of courses in terms of content, timing and ease of access (Factor 16) and prior research training (Factor 17). Finally, prior doctoral-completion literature identifies that, for some doctoral students, pressure to publish negatively impacts progression (Larkin 1999) (Factor 18).

Student-doctoral culture fit

In general, we propose that:

P1.3: Doctoral student performance is associated with doctoral students' perceptions of fit with doctoral culture.

Student-doctoral culture fit has three sub-dimensions: student-learning identity fit, student-(academic)writing fit and student-personal characteristics fit.

Student-learning identity fit. Doctoral entrants experience more pronounced student-learning identity changes than any other postgraduate entrants due to the unique nature of doctoral education. Supervision is complex and diverse (Donnelly 2008), the curriculum is relatively unstructured and learning through research is deep and meaningful (Wisker et al. 2003). In addition, doctoral studies involve students taking more personal responsibility for their own learning (Fry, Pearce, and Bright 2007).[3] Students may not have anticipated the nature of doctoral education. Experience of the new learning approach may cause divergence from student-doctoral culture fit. The size of the doctoral project may cause problems for some students, as many do not have prior experience of working on such a large project (Wisker et al. 2003). Coping with the shift in learning identity, from 'merely studying' to researching a large project, involves an increased level of self-reliance, independent learning and working in isolation (Becher, Henkel, and Kogan 1994; Hockey 1996; Tobbell, O'Donnell, and Zammit 2010). We predict the influence of student-learning identity fit, as captured by the perceived difficulty in transitioning to the new learning identity, on timely completion under Proposition 1.3a.

P1.3a: Doctoral student performance is associated with doctoral students' perceptions of fit with the doctoral learning environment.

The student-doctoral education fit analytical model (Table 1) identifies four measures to capture divergence in student-learning identity fit, including difficulties with working independently (Factor 19), the isolation of working alone (Factor 20), project size (Factor 21) and managing such a large project (Factor 22).

Student-(academic) writing fit. A doctoral qualification typically requires students to submit a large tome that clearly explains and justifies their research. Writing skills are therefore very important. Academic writing differs from undergraduate and professional writing. Some students find the transition to academic writing particularly difficult. We term this student-(academic)writing fit. In pre-doctoral level education, students can write by accumulating and summarising large amounts of facts. Students find academic writing difficult. Students need to understand their topic, reflect their thinking, creativity and contribution (Martin 2009), whilst also connecting the research question and prior studies, interpreting their results against earlier studies and their research question (Wisker et al. 2003). Though no study tests an association between (academic)writing and timely doctoral completion, tangential empirical studies find individuals who complete their doctorate earlier are more proficient in generating academic articles later in their careers (Blackburn and Lawrence 1995; as cited in Fogarty and Ravenscroft 1999; Thompson, Hodge, and Flesher 1995). In a study on doctoral supervision in the UK, Hockey (1996) reports that supervisors find students inhibited in writing up their research and presenting drafts to their supervisors for critique. Therefore:

P1.3b: Doctoral student performance is associated with doctoral students' perceptions of fit with academic writing.

We operationalise this dimension of doctoral culture fit under the student-doctoral education fit analytical model in Table 1 by Factor 23 (difficulties with academic writing), which can be explored under Proposition 1.3b.

Student-personal characteristics fit. Student-personal characteristics fit is affected by individuals' adaptability in respect of social processes, personal beliefs and meanings (Rogers 2006). Bloomer and Hodkinson (2000) identify the importance of self-management when individuals remain in postgraduate education, which can result in changes in students' values, which impact on their learning identity and fit with doctoral education. Structural factors affect changes to student values, such as critical-feedback mechanisms, that form part of the study curriculum. We predict the potential links between student-personal characteristics and doctoral student performance under Proposition 1.3c.

P1.3c: Doctoral student performance is associated with doctoral students' perceptions of fit between their personal characteristics and doctoral education.

In the student-doctoral education fit analytical model, we consider four factors as measures that can capture divergence from student-personal characteristics fit. Two provide information on character shifts and capture the impact of students' learning experiences on their self-esteem: Factor 24 collates information on whether students perceive a loss of status since enrolling and Factor 27 identifies whether students' confidence has deteriorated since enrolling. The third, Factor 25, provides a measure of fit with doctoral feedback mechanisms in terms of criticism of students' work. Finally, Factor 26 focuses on determining whether students find difficulty balancing work, study and outside interests in terms of time management.

Conclusions

Using the theories of fit, we expand Baker and Pifer's (2015) doctoral education fit framework to create a student-doctoral education fit multidimensional framework that predicts doctoral

education fit across three fit dimensions and eight sub-dimensions. The dimensions include student-doctoral environment fit (encapsulating student-organisation fit, student-private environment fit and student-people fit), student-vocation fit (encapsulating student-motivation fit and student-learning environment fit) and student-doctoral culture fit (encapsulating student-learning identity fit, student-(academic)writing fit and student-personal characteristics fit). We then operationalise this theoretical framework to examine the association between fit and doctoral student performance. A review of the literature on doctoral student performance identifies 27 factors found to affect doctoral student performance. These are matched to the fit sub-dimensions to create an analytical model that can be used by researchers to design instruments to test our propositions. Our analytical framework and associated analytical model facilitate a holistic multidimensional approach that enables an overall measure of fit to be determined. In addition, by separating out the dimensions and providing a means of measuring fit, insights can be obtained at dimension and sub-dimension level as well as at individual fit-factor level. Our analytical framework and model provide a springboard for much-needed empirical testing of the links between doctoral student performance and fit. Studies could also rank the relative importance of the different fit dimensions, sub-dimensions and individual fit factors on doctoral student performance. This is important as, in times of tight budgets, policy makers can direct attention and funding to areas perceived by students to have the greatest positive or negative influence on doctoral student performance.

Our study has limitations. Our study is a starting point in evaluating student-doctoral education fit. However, it does not go far enough in predicting the relationship between fit and the individual. Fit is multidimensional and doctoral students are multidimensional. Empirical studies would need to include control variables to try to capture differences in the characteristics of individuals, such as gender, age, marital status, commitments, pre-entry characteristics. In particular, stage of completion would need to be controlled for as fit is fluid and is expected to change as students progress through their doctoral programme. To understand how our 27 fit factors coalesce in the lived experience of real doctoral candidates, we are testing our analytical model by means of a questionnaire survey of doctoral students, together with in-depth interviews focussing on the influence of fit factors on timely doctoral completion. Related to this, many doctoral students enrol at a time of change in their personal life, for example, getting married, buying a house or having a baby. Therefore, to obtain further insights into influences on doctoral student performance, research should examine whether deviation from perceived fit with doctoral education is greater for some entrants than others by analysing differences for student characteristics and chosen mode of study. Finally, our doctoral education fit analytical framework is wide as it is driven by prior empirical findings. We kept it wide on purpose, though it can be adapted for different jurisdictions that may have different types of doctoral education.

Notes

1. Schneider and Sadowski (2010) identify four models of doctoral education: Unstructured Master-Apprentice model (common in Germany, Switzerland), structured graduate school, structured graduate centre and mixed (unstructured and structured) models. In structured models, the student-supervisor relationship may only be established a year or more into the programme. Models can also be differentiated depending on whether doctoral programmes provide mentored training versus formal coursework. We acknowledge there is considerable variation and hence our framework needs to be versatile. For example, in Scandinavian countries doctoral students are typically salaried, hence the elements of the framework that capture the influence of funding are not relevant and could be removed for these countries.
2. General management education studies focus on classroom fit (Westerman and Vanka 2005). However, this is less relevant to doctoral education.
3. In contrast to the theoretical assertions, in their study of five UK universities, Tobbell, O'Donnell, and Zammit (2010) find no material differences in identity negotiation experienced by doctoral students and other postgraduate students.

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